

WHAT IS CLAIMED IS:

1 1. A process for rendering a manufactured article identifiable,
2 comprising adding to said article during its manufacture or coating upon said article,
3 a quantity of at least one taggant selected from the group consisting of up-
4 converting, down-converting, and up- and down-converting metal oxide
5 nanoparticles having an average size of less than 500 nm, said quantity sufficient
6 upon illumination by an exciting energy source to generate an emission detectable
7 against a background, said emission having a wavelength different from the
8 wavelength absorbed by the taggant.

1 2. The process of claim 1, wherein said metal oxide
2 nanoparticles are mixed metal oxide nanoparticles.

1 3. The process of claim 1, wherein said nanoparticles have an
2 average size of less than 200 nm.

1 4. The process of claim 1, wherein said nanoparticles have an
2 average size of less than 100 nm.

1 5. The process of claim 2, wherein said mixed metal oxide
2 nanoparticles comprise a plurality of phases of metal oxide of differing composition.

1 6. The process of claim 1, wherein said nanoparticles contain
2 luminescent centers comprising at least one transition metal or rare earth metal
3 dopant in a metal oxide matrix.

1 7. The process of claim 2, wherein said nanoparticles contain
2 luminescent centers comprising at least one transition metal or rare earth metal
3 dopant in a metal oxide matrix.

1 8. The process of claim 6, wherein at least one of said dopants
2 is one selected from the group consisting of Yb, Eu, Er, Tm, Gd, U, Pr, Ce, Mn,
3 Zn, Ru, Fe, Co, and Cr.

1 9. The process of claim 1, wherein at least a portion of said
2 nanoparticles comprise yttria doped with one or more transition or rare earth dopant
3 metals.

1 10. The process of claim 1, wherein at least two different
2 populations of nanoparticles are employed, each population containing nanoparticles
3 exhibiting a different emission than at least one other population of nanoparticles.

1 11. An article prepared by the process of claim 1.

1 12. An article prepared by the process of claim 2.

1 13. An article prepared by the process of claim 4.

1 14. An article prepared by the process of claim 6.

1 15. An article prepared by the process of claim 10.

1 16. The article of claim 10 which is a metal or metal alloy.

1 17. The article of claim 10 which comprises a glass or ceramic
2 material.

1 18. The article of claim 10 which comprises a polymer.

1 19. A process for identifying a taggant-laden article, comprising
2 exposing an article prepared by the process of claim 1 with an energy
3 source absorbable by said nanoparticles and causing said nanoparticles to emit light
4 energy as a result of said exposing;

5 detecting one or more wavelengths of emission of said nanoparticles,
6 and comparing detected emission to emission expected of an article containing said
7 nanoparticles.

1 20. The process of claim 19, wherein said nanoparticles have an
2 average particle size of less than 100 nm, and comprise at least one metal oxide
3 containing transition or rare earth metal doped luminescent centers.

1 21. The process of claim 20, wherein said nanoparticles are
2 multiphase nanoparticles containing at least two phases of metal oxides of different
3 compositions.

1 22. The process of claim 19, wherein said nanoparticles comprise
2 at least two different populations of nanoparticles are employed, each population
3 containing nanoparticles exhibiting a different emission than at least one other
4 population of nanoparticles.

1 23. The process of claim 19, wherein said energy source
2 comprises infrared light, ultraviolet light, or both infrared and ultraviolet light, and
3 said nanoparticles emit visible light.

1 24. The process of claim 23, wherein said energy source
2 comprises one or more lasers.